

# Pond-ering Clean Water

## Schoolhouse Minister Pond

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Association to  
Preserve Cape Cod

# Pond-ering Clean Water

## Schoolhouse Minister Pond



- ◇ Pond Basics
- ◇ Problems at Schoolhouse Minister Pond
- ◇ Work Done to Date
- ◇ Planning for Stormwater Management

April Wobst

Restoration Ecologist

Association to Preserve Cape Cod



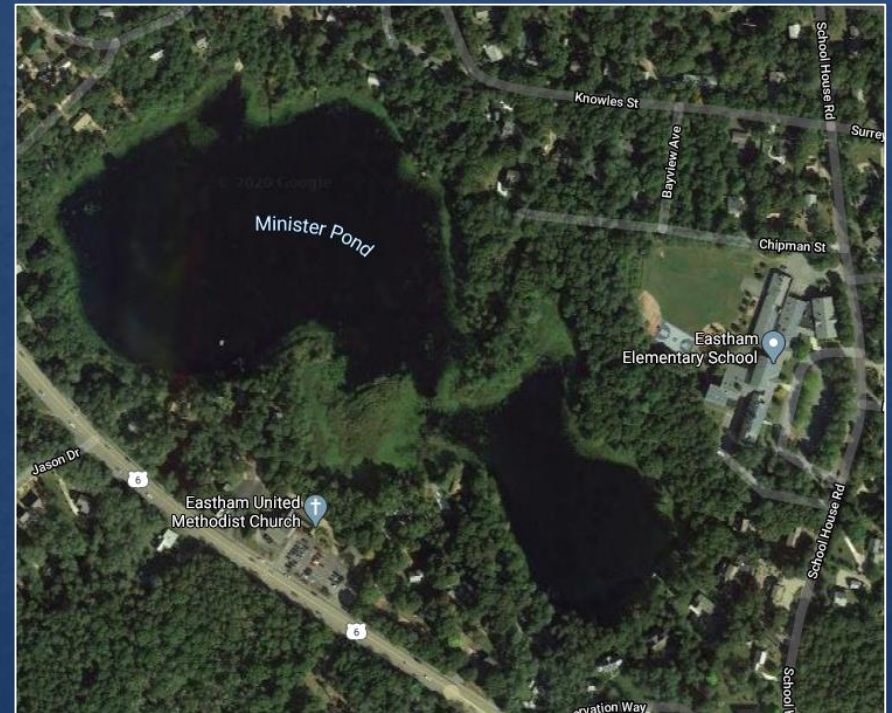
# Intro to Cape Cod Ponds



- ◇ ~1000 lakes and ponds on Cape!
- ◇ Most are kettle ponds (glacial)
- ◇ Some man-made (dams)
- ◇ Some joined the sea (salt ponds)
- ◇ Eastham: 23 ponds, 258 acres

# Schoolhouse Minister Pond: Bio

- ◆ Separated basins
- ◆ Minister Pond: 16.8 acres, 4.3 meters deep (~14ft)
- ◆ Schoolhouse Pond: 5.6 acres, 4.5 meters deep (~14ft)
- ◆ Groundwater-flooded kettle holes
- ◆ Despite shallow depths (less than 9 meters) thermally stratified in summer

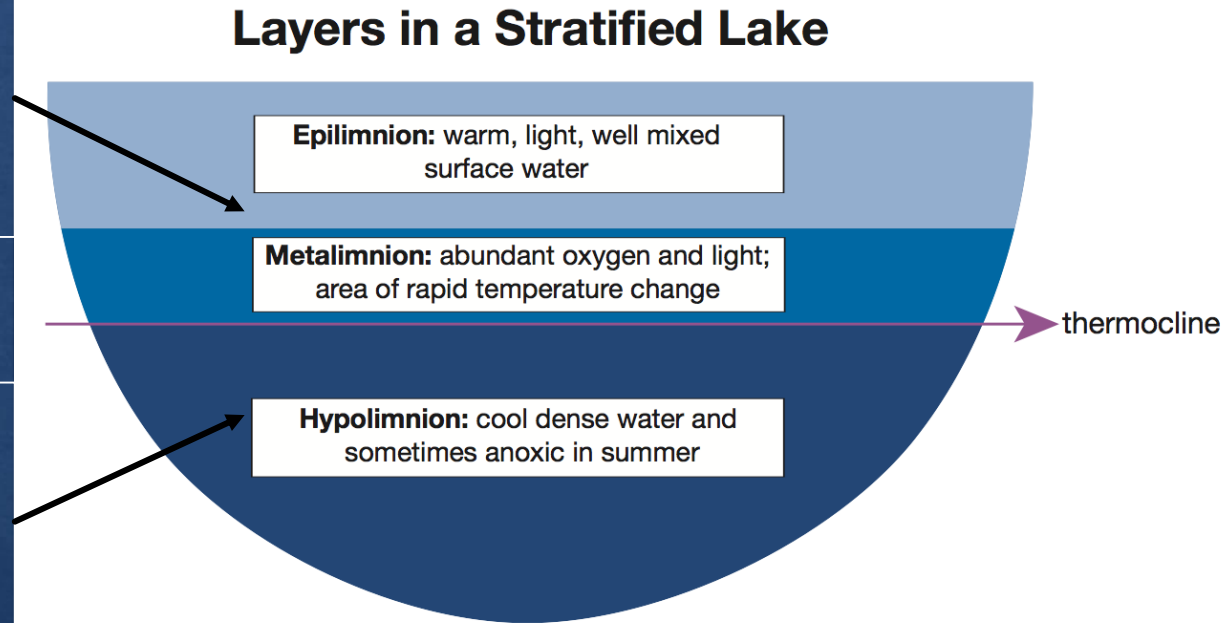




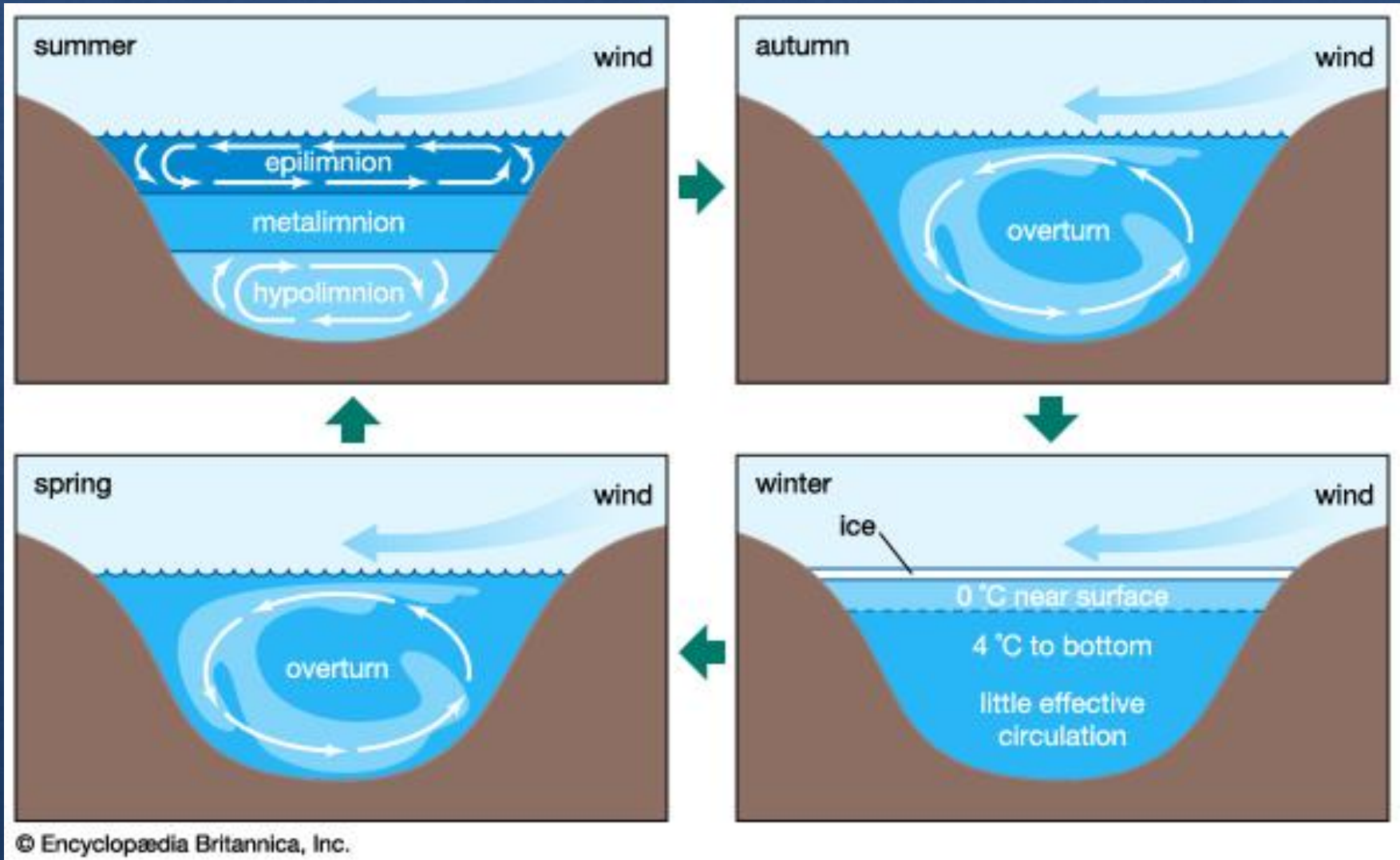
# Deep Ponds

- primary production
- photosynthesis
- +oxygen
- nutrient uptake

- decomposition
- respiration
- -oxygen
- nutrient release



# Pond Stratification & Mixing



# Schoolhouse Minister Pond Studies

## 2008 SMAST

- ◆ 10 ponds studied in Eastham 2001 to 2006
- ◆ Part of Barnstable County PALS program
- ◆ Measure: Temperature, DO, Secchi Disk Water Clarity, Alkalinity, Chlorophyll-a, Total Nitrogen, pH, Total Phosphorus

## Solitude Lake Management

- ◆ Assessment of Pond Conditions since 2009
- ◆ Monitoring Vegetation and Water Quality



# Study Results

- ❖ Poor water clarity (Secchi depth less than 4ft)
- ❖ High chlorophyll a = LOTS of algae!
- ❖ Average total phosphorus more than double the PALS healthy pond threshold 10ppb
- ❖ Average total nitrogen exceeded PALS healthy pond threshold 0.31ppm. Higher nitrogen load in Minister.
- ❖ Both ponds classified as Eutrophic (SMAST)
- ❖ DO less than 5-6mg/l needed to support fisheries
- ❖ Anoxic conditions ( $<1$ ppm) in bottom waters in summer months
- ❖ Nuisance aquatic plant growth
- ❖ Phragmites stands northeast of Pond





# Schoolhouse Minister Pond Plan

Comprehensive Multi-Step  
Approach

1. **Treatment of Phragmites**
2. Hydorraking
3. Aeration
4. Alum Treatment
5. Stormwater Management



# Schoolhouse Minister Pond Plan

## Comprehensive Multi-Step Approach

1. Treatment of Phragmites
2. **Hydroraking**
3. **Aeration**
4. Alum Treatment
5. Stormwater Management



Videos: Hydroraking and Aeration



# Schoolhouse Minister Pond Plan

## Comprehensive Multi-Step Approach

1. Treatment of Phragmites – Invasive Species Control
2. Hydroraking – Aquatic Plant Management
3. Aeration – Increase Dissolved Oxygen and Stabilize Nutrients in Soil
4. **Alum Treatment - Phosphorus Inactivation**
5. **Stormwater Management – Reduce Source Input of Nutrients**

# Estimated Phosphorus Budget

## Minister Pond

- ◆ Septic: 0-46%
- ◆ Lawns: 4-8%
- ◆ Roof runoff: 9-18%
- ◆ Birds: 10-29%
- ◆ Roads: 30-60%

## Schoolhouse Pond

- ◆ Septic: 0-18%
- ◆ Lawns: 1-2%
- ◆ Roof runoff: 3-5%
- ◆ Birds: 38-86%
- ◆ Roads: 18-34%

Source: SMAST 2008 Study



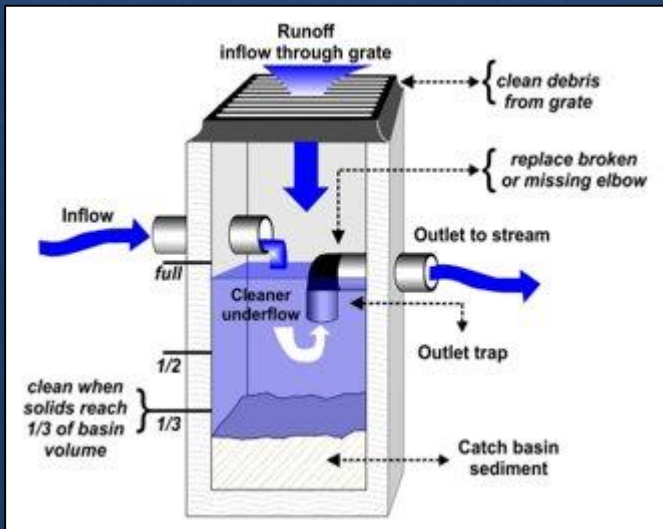
# Stormwater Inputs



Stormwater 101 Video



# Traditional vs Green Infrastructure Stormwater Management



Catch Basin



© Gerald Beetham



# Stormwater Management

Schedule	Task
February	Kick Off Meeting and Plan Review
March-April	Site Assessment and Concept Design Development
May-June	Fisherman's Landing 75% Design and Permit Application Route 6 Alternative 25% Design Development
August	Public Meeting and Permit Review
Fall	Final Design and Construction Fisherman's Landing Route 6 Revise 25% Design and Outreach to DOT and DCR



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Questions?